CLAIMS

What is claimed is:

1. A method for identifying a bitloading assignment for a multicarrier communication channel having a number of sub-channels, a maximum capacity assignment, and a disposable bit capacity of one or more bits, the method comprising:

identifying a sub-channel having a maximum bit loading relative to bit loadings of other sub-channels;

decrementing the bit loading of the identified sub-channel by at least one bit thereby reducing bit loading differences between the identified sub-channel and the other sub-channels;

decrementing the disposable bit capacity by the number of bits the identified sub-channel loading was decremented; and

repeating the identifying step and the decrementing steps until a desired degree of equalization between the sub-channel bit loadings is achieved thereby producing a bitloading assignment for the multicarrier communication channel.

2. The method of claim 1, wherein the steps are carried out by a set of codes or instructions executed by a processor included in a transceiver of the multicarrier communication system.

3. The method of claim 1, wherein in response to a number of sub-channels having the same maximum bit loading, the identifying step further includes:

selecting one of the sub-channels having the same maximum bit loading based on a predefined selection scheme.

4. The method of claim 1, wherein the number of bits by which the identified sub-channel loading is decremented depends on at least one of the number of sub-channels of the multicarrier communication channel, the disposable bit capacity of the

multicarrier communication channel, and a bitmap associated with the multicarrier communication channel.

5. The method of claim 1, further comprising:

transmitting the bitloading assignment to a remote transceiver operatively coupled to the multicarrier communication channel thereby allowing the remote transceiver to use the bitloading assignment in performing bitloading.

6. The method of claim 1, wherein the desired degree of equalization between the sub-channel bit loadings is achieved when the disposable bit capacity is zero.

7. The method of claim 1, wherein the bitloading assignment produced by the method desensitizes the multicarrier communication channel to non-stationary noise.

8. The method of claim 1, wherein the multicarrier communication channel is realized with an ADSL Annex C transceiver pair coupled to one another via a transmission line.

9. The method of claim 1, wherein the multicarrier communication channel is effectively two different channels, one being a FEXT time channel and the other being a NEXT time channel, each effective channel having a unique maximum capacity assignment upon which the method operates thereby producing a first bitloading assignment for the FEXT channel and a second bitloading assignment for the NEXT channel.

10. The method of claim 1, wherein the maximum capacity assignment of the multicarrier communication channel is derived from a bitmap prepared during a bitloading training session.

11. The method of claim 1, wherein the maximum capacity assignment of the multicarrier communication channel is in the form of a bit vector upon which the method operates.

12. A method for identifying a bitloading assignment for a multicarrier communication channel having a number of sub-channels, the method comprising:

calculating a maximum number of bits that can be transmitted by each sub-channel;

rounding the maximum number of bits that can be transmitted by each sub-channel to the nearest whole bit;

calculating the maximum number of bits that can be transmitted by the multicarrier communication channel based on the rounded maximum number of bits that can be transmitted by each sub-channel;

determining a target load of the multicarrier communication channel thereby defining a disposable bit capacity representing a delta value between the maximum number of bits that can be transmitted by the multicarrier communication channel and the target load of the multicarrier communication channel;

identifying a maximum loaded sub-channel;

decrementing the maximum loaded sub-channel by at least one bit;

decrementing the delta value; and

repeating the identifying step and the decrementing steps until the delta value is zero thereby producing a bitloading assignment that desensitizes the multicarrier communication channel to non-stationary noise.

13. The method of claim 12, wherein the maximum number of bits that can be transmitted by each sub-channel, and the maximum number of bits that can be transmitted by the multicarrier communication channel are derived from a bitmap resulting from a bitloading training sequence, the bitmap characterizing the signal to noise ratio of the multicarrier communication channel.

14. The method of claim 12, wherein the target load of the multicarrier communication channel is based on system configuration options.

15. The method of claim 12, wherein the multicarrier communication channel is realized using digital multi-tone modulation.

16. The method of claim 12, wherein in response to identifying more than one maximum loaded sub-channel thereby requiring a selection to be made, the method further includes:

calculating a round off error for each sub-channel; and

selecting the maximum loaded sub-channel having the greatest round off error.

17. The method of claim 12, wherein in response to identifying more than one maximum loaded sub-channel thereby requiring a selection to be made, the method further includes:

selecting the maximum loaded sub-channel based on a predefined selection scheme.

18. A transceiver for identifying a bitloading assignment for a multicarrier communication channel having a number of sub-channels and a disposable bit capacity of one or more bits, the transceiver comprising:

a bitloading assignment module for equalizing bit loadings of the sub-channels by selectively decrementing high bitload sub-channels until the disposable bit capacity is zero thereby producing a bitloading assignment for the multicarrier communication channel.

19. The transceiver of claim 18, further comprising:

a symbol decision and symbol-to-bit decoder module operatively coupled to the bitloading assignment module and for deriving a maximum capacity assignment from a bitmap that characterizes the multicarrier communication channel.

20. The transceiver of claim 18, wherein the high bitload sub-channels are decremented by a number of bits depending on at least one of the number of sub-channels of the multicarrier communication channel, the disposable bit capacity of the multicarrier

communication channel, and a bitmap associated with the multicarrier communication channel.

21. The transceiver of claim 18, wherein the high bitload sub-channels are decremented one bit at a time.

22. The transceiver of claim 18, wherein the disposable bit capacity cannot be below zero as a result of decrementing high bitload sub-channels.

23. The transceiver of claim 18, wherein the bitloading assignment is enhanced in that it desensitizes the multicarrier communication channel to non-stationary noise.

24. The transceiver of claim 18, wherein the multicarrier communication channel is effectively two different channels, one being a FEXT time channel and the other being a NEXT time channel, each effective channel having a unique maximum capacity assignment upon which the bitloading assignment module operates thereby producing a first bitloading assignment for the FEXT channel and a second bitloading assignment for the NEXT channel.

25. The transceiver of claim 18, wherein the bitloading assignment is in the form of a bit vector upon which the bitloading assignment module operates.

26. The transceiver of claim 18, wherein the bitloading assignment module selects a high bitload sub-channel for decrementing based on a predefined selection scheme.

27. A method for identifying a bitloading assignment for an ADSL Annex C multicarrier communication channel having a number of sub-channels, a maximum capacity assignment, and a disposable bit capacity of one or more bits, the method comprising:

identifying a sub-channel having a maximum bit loading relative to bit loadings of other sub-channels;

decrementing the bit loading of the identified sub-channel by at least one bit thereby reducing bit loading differences between the identified sub-channel and the other sub-channels;

decrementing the disposable bit capacity by the number of bits the identified sub-channel loading was decremented; and

repeating the identifying step and the decrementing steps until the disposable bit capacity is zero thereby producing a bitloading assignment that desensitizes the ADSL Annex C multicarrier communication channel to non-stationary noise.

28. A method for identifying a bitloading assignment for an ADSL Annex C multicarrier communication channel having a FEXT channel, a NEXT channel, and an overall target bit capacity, the method comprising:

equalizing bits allocated to the FEXT channel and the NEXT channel until the overall target bit capacity is achieved thereby identifying a target bit capacity for the FEXT channel and a target bit capacity for the NEXT channel;

equalizing bits allocated to sub-channels included in the FEXT channel by:

identifying a sub-channel having a maximum bit loading relative to bit loadings of other sub-channels of the FEXT channel;

decrementing the bit loading of the identified sub-channel by at least one bit thereby reducing bit loading differences between the identified sub-channel and the other sub-channels; and

repeating the identifying step and the decrementing steps until the target bit capacity for the FEXT channel is achieved thereby producing a bitloading assignment that desensitizes the FEXT channel to non-stationary noise;

equalizing bits allocated to sub-channels included in the NEXT channel by:

identifying a sub-channel having a maximum bit loading relative to bit loadings of other sub-channels of the NEXT channel;

decrementing the bit loading of the identified sub-channel by at least one bit thereby reducing bit loading differences between the identified sub-channel and the other sub-channels; and

repeating the identifying step and the decrementing steps until the target bit capacity for the NEXT channel is achieved thereby producing a bitloading assignment that desensitizes the NEXT channel to non-stationary noise.

29. A transceiver for identifying a bitloading assignment for an ADSL Annex C multicarrier communication channel having a FEXT channel, a NEXT channel, and an overall target bit capacity, the transceiver comprising:

a bitloading assignment module adapted to equalize bits allocated to the FEXT channel and the NEXT channel until the overall target bit capacity is achieved thereby identifying a target bit capacity for the FEXT channel and a target bit capacity for the NEXT channel, and the bitloading assignment module further adapted to equalize bits allocated to sub-channels included in the FEXT channel until the target bit capacity for the FEXT channel is achieved thereby producing a bitloading assignment that desensitizes the FEXT channel to non-stationary noise, and the bitloading assignment module further adapted to equalize bits allocated to sub-channels included in the NEXT channel until the target bit capacity for the NEXT channel is achieved thereby producing a bitloading assignment that desensitizes the NEXT channel to non-stationary noise.

30. A method for identifying a bitloading assignment for an ADSL Annex C multicarrier communication channel having a FEXT channel, a NEXT channel, and an overall target bit capacity, the method comprising:

equalizing bits allocated to the FEXT channel and the NEXT channel until the overall target bit capacity is achieved thereby identifying a target bit capacity for the FEXT channel and a target bit capacity for the NEXT channel.

31. A method for identifying a bitloading assignment for an ADSL Annex C multicarrier communication channel having a FEXT channel, a NEXT channel, and an overall target bit capacity, the method comprising:

allocating bits between the FEXT channel and the NEXT channel until the overall target bit capacity is achieved thereby identifying a target bit capacity for the FEXT channel and a target bit capacity for the NEXT channel.